



U.S. Department of Energy
Office of Civilian Radioactive Waste Management



Briefing on DOE Spent Nuclear Fuel Technical Exchange of March 5 and 6, 2003

Presented to:
**National Spent Nuclear Fuel Program Strategy
Meeting**

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Scope of Technical Exchange

- **Limited to DOE SNF; excludes other waste forms such as immobilized plutonium, high-level waste, commercial mixed oxide, etc.**
- **Focus on conceptual level issues**



Topics Covered in Technical Exchange

- **Overview of DOE SNF**
- **Handling and Disposal of DOE SNF**
- **Yucca Mountain Project Approach to Control of Criticality and Radionuclide Transport**
- **DOE SNF Source Term Development**
- **DOE SNF Canisters**
- **DOE SNF Approach for Postclosure Assessment Total System Performance Assessment-License Application (TSPA-LA)**
- **Criticality Analyses**



Handling and Disposal of DOE Spent Nuclear Fuel

- **Regulatory and Interface Documents**
- **Waste Form**
- **Repository Surface Facilities**
- **Waste Packages**
- **Subsurface Disposal**



Yucca Mountain Project Approach to Control of Criticality and Radionuclide Transport

- **Design and Safety Analysis Principles**
- **General Approach to Control of Criticality and Radionuclide Transport**
- **Specific Approach for DOE SNF**
- **Confidence Building Evaluations**



Source Term Development

- **Objective**
- **Applications**
- **Methodology**
- **Conservatisms**
- **Estimated Radionuclide Inventory**
- **Adequacy for Postclosure**



General Approach in Source Term Development

- **Develop a consistent and defensible method to estimate radionuclide inventory for all DOE SNF**
- **Support postclosure TSPA-LA analyses**
- **Developed templates for reactor types based on enrichment, moderator, cladding, fuel compound**
- **Highest burn-ups were used**



DOE Spent Nuclear Fuel Canisters

- **Role of the Canisters in Preclosure Analysis**
- **Design Considerations**
- **Canister Design**
 - **Standardized DOE SNF Canister**
 - **Multi-Canister Overpack**
- **Qualification Plan**
- **Implementation of the Qualification Plan**
- **Canister Deployment**



DOE Spent Nuclear Fuel Approach for Postclosure Assessment

- **Introduction to TSPA-LA Model**
- **Approach to Include DOE SNF in TSPA-LA**
- **DOE SNF Groups for TSPA-LA**



Preclosure Criticality Analyses

- **Preclosure Criticality Approach**
- **Event Sequence Evaluation Process**
- **Non-Waste Package Criticality**
 - Event Sequences
 - Methodology
- **Waste Package Criticality**
 - Event Sequences
 - Methodology



Postclosure Criticality Analyses

- **Postclosure Criticality Methodology**
- **DOE Spent Nuclear Fuel Groupings**
- **DOE Spent Nuclear Fuel Waste Packages**
- **Postclosure Criticality Analysis**



Summary of Technical Exchange Highlights

- **Most DOE SNF will be shipped to Yucca Mountain in standardized canisters**
- **DOE-owned intact commercial spent nuclear fuel will be shipped bare**
- **Standard canisters have a low-breach probability**
- **Preclosure consequences of canister breach will not be evaluated**



Summary of Technical Exchange Highlights

- **Preclosure criticality is expected to be screened out on the basis of moderator exclusion from the Dry Transfer Facility**
- **Postclosure criticality is expected to be screened out on the basis of low probability of occurrence**
- **TSPA-LA analyses will use a surrogate fuel inventory based on the DOE SNF source term estimates**
- **Postclosure doses from DOE SNF are expected to be significantly less than those from commercial spent nuclear fuel**

